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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,192	01/15/2002	Heinrich Bachmann	20347 US1 (C38435/128985)	4078

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EXAMINER	
PAK, YONG D	

ART UNIT	PAPER NUMBER
1652	16

DATE MAILED: 09/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/053,192	BACHMANN ET AL.	
	Examiner	Art Unit	
	Yong D Pak	1652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) *1-5,16-18 and 33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6-15,19-32 and 34-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. *09/504,393* .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

The instant application as originally filed contains two claims 27. In accordance with 37 CFR § 1.126, starting at the second occurrence of claims 27, claims have been renumbered 28-36 with dependencies changed accordingly. The new numbers have been used hereinafter.

This application is a CIP of 09/504,393.

Claims 1-36 are pending.

Election/Restrictions

Applicant's election of Group II in Paper No. 9 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 1-5, 16-18 and 33 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 9.

The restriction requirement contained an error in referring to the invention as a dioxygenase. All pending claims are drawn to a monooxygenase.

Priority

Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows:

The second application must be an application for a patent for an invention which is also disclosed in the first application (the parent or provisional application); the disclosure of the invention in the parent application and in the second application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See Transco Products, Inc. v. Performance Contracting, Inc., 38 F.3d 551, 32 USPQ 2d 1077 (Fed. Cir. 1994).

The parent application, 09/504,393, does not disclose a polypeptide having β,β-carotene 15,15'-monooxygenase oxidase, making said enzyme or using said enzyme, which is claimed in the instant application. Therefore, the benefit of the filing date of 09/504,393 is denied.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on April 15, 2002 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

Claims 6 and 19 are objected to as being dependent upon a non-elected base claim. However for the interest of a compact prosecution, claims 6 and 19 have been interpreted with the limitations of claim 1.

Claims 8-9 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicants are required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claims 8-9 ultimately depend on claim 1, which recites a DNA encoding a polypeptide having β,β-carotene 15,15'-monooxygenase activity and being 60% homologous to SEQ ID NO:1. Claims 8-9 do not include the limitation of the claim on which it depends because a DNA fragment of 20 bases cannot encode a polypeptide that is more than 60% identical to SEQ ID NO:1.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 8-9 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 7, if correctly read as ultimately depending on clam 1, includes only a fragment of SEQ ID NO:2 that is enzymatically active and encodes a sequence that is 60% homologous to SEQ ID NO:1. Such fragment must be about 1800 bases or 60% of 3111 bases of SEQ ID NO:2. However, claims 8 and 9 recite 20 and 30 bases,

respectively, and the structural limitations in these two claims amount to about 1 %(see rejection under 35 U.S.C. § 112, second paragraph for vagueness of claims 8-9). Therefore, these claims are drawn to a genus of enzymes described by its function. Applicants fail to describe any representative species by identifying characteristics or structural properties other than the functionality of being a β,β-carotene 15,15'-monooxygenase oxidase.

Given this lack of description of the representative species encompassed by the genus of the claims, the specification fails to sufficiently describe the claimed invention in such full, clear, concise, and exact terms that a skilled artisan would recognize that applicants were in possession of the inventions of claims 7-9.

Claims 6-15 and 19-27 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for DNA molecules encoding SEQ ID NO: 1, does not reasonably provide enablement for any DNA or DNA fragments encoding a β,β-carotene 15,15'-monooxygenase having 60% homology to SEQ ID NO:1 or comprising 20 or 30 bases of SEQ ID NO:2. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

Factors to be in In re Wands 858 F.2d 731, 8 USPQ2nd 1400 (Fed. Cir, 1988). They include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7)

considered in determining whether undue experimentation is required, are summarized the predictability or unpredictability of the art, and (8) the breadth of the claims.

While recombinant and mutagenesis techniques are known, it is not routine in the art to screen large number of nucleic acids that have been modified because the result of such modifications is unpredictable. A nucleic acid sequence encodes the amino acid sequence, which determines the structural and functional properties of an enzyme. Applicants do not teach which 60% of SEQ ID NO:1 must be retained and which 40% of SEQ ID NO:1 can be modified and result in a functional β,β-carotene 15,15'-monooxygenase oxidase. Furthermore, applicants do not teach which 20 or 30 nucleic acids must be present in a DNA fragment for it to encode a functional β,β-carotene 15,15'-monooxygenase oxidase. Also, it is unpredictable whether a DNA fragment comprising 20 or 30 bases, which amount to about 1 % of SEQ ID NO:2, encodes a functional enzyme. Therefore, the breadth of these claims is much larger than the scope enable by the specification.

The specification, as discussed above, does not support the broad scope of the claims because the specification does **not** establish: (A) regions of the β,β-carotene 15,15'-monooxygenase oxidase structure which may be modified without effecting its activity; (B) the general tolerance to modification and extent of such tolerance; (C) a rational and predictable scheme for modifying any residues with an expectation of obtaining the desired biological function; and (D) the specification provides insufficient guidance as to which of the essentially infinite possible choices is likely to be successful.

Therefore, one of ordinary skill would require guidance, in order to make DNA or DNA fragments encoding β,β-carotene 15,15'-monooxygenase oxidase having 60 % homology to SEQ ID NO:1 or comprising 20 or 30 bases of SEQ ID NO:2 in a manner reasonable correlated with the scope of the claims. Without such guidance, the experimentation left to those skilled in the art is undue.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 8-9 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 8-9, as written, recite a DNA fragment containing at least 20 or 30 nucleic acids of SEQ ID NO:2 with the limitations of claims 1 and 6. However, the claims are unclear because a DNA fragment of 20 bases, which roughly equals to 7 amino acid residues, cannot encode an enzyme that is more than 60% identical to SEQ ID NO:1. Therefore, claims 8-9 have been interpreted as DNA fragments comprising 20 or 30 bases of SEQ ID NO:2 which encodes a polypeptide with β,β-carotene 15,15'-monooxygenase oxidase activity.

Claim 11 recites an antisense RNA. Claim 11 depends on claim 6 which comprises of nucleic acids encoding β,β-carotene 15,15'-monooxygenase oxidase. The claim is unclear because an antisense by definition does not encode a polypeptide but is complementary to a mRNA of a polypeptide.

Claim Rejections - 35 USC § 102

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 6-10, 12-15, 19, 21, 24, 26-32 and 34-36 are rejected under 35 U.S.C. 102(b) as being anticipated by Wyss et al.

The instant claims are drawn to a nucleic acid sequence of SEQ ID NO:2 encoding a β,β-carotene 15,15'-monooxygenase oxidase of SEQ ID NO:1 and variants and fragments of a nucleic acid molecule encoding a β,β-carotene 15,15'-monooxygenase oxidase.

Wyss et al. (Biochem. Biophy. Res. Com. - form PTO-892) teach a nucleic acid molecule that is 100% identical to SEQ ID NO:2. The encoded oxygenase is 100% identical to the oxygenase of SEQ ID NO: 1 (pages 334-336). The nucleic acid sequence of Wyss et al. and the nucleic acid sequence of the instant invention encode the same enzyme. Wyss et al. also teach fragments, primer/probes and kits comprising said primer/probes (pages 334-336). Therefore, the nucleic acid sequence of Wyss et al. comprises of SEQ ID NO:2 and fragments of SEQ ID NO:2.

Wyss et al. also teach a method of introducing said nucleic acid sequence into a mammalian and prokaryotic host cell, a vector comprising said nucleic acid sequence and a host cell transformed with said vector.

Therefore, the teachings of Wyss et al. anticipate claims 6-10, 12-15, 19, 21, 24, 26-32 and 34-36.

Claims 6-10 and 28-30 rejected under 35 U.S.C. 102(a) as being anticipated by Leuenberger et al.

The instant claims are drawn to a nucleic acid sequence of SEQ ID NO:2 encoding a β,β-carotene 15,15'-monooxygenase oxidase of SEQ ID NO:1 and variants and fragments of a nucleic acid molecule encoding a β,β-carotene 15,15'-monooxygenase oxidase.

Leuenberger et al. teach a nucleic acid molecule that is 100% identical to SEQ ID NO:2. The encoded oxygenase is 100% identical to the oxygenase of SEQ ID NO: 1 (pages 334-336). Therefore, the nucleic acid sequence of Wyss et al. comprises of SEQ ID NO:2 and fragments of SEQ ID NO:2.

Therefore, the teachings of Leuenberge et al. anticipate claims 6-10 and 28-30.

Claims 6-10, 12-15, 19, 24, 26-32 and 34-36 rejected under 35 U.S.C. 102(a) as being anticipated by Wyss et al.

The instant claims are drawn to a nucleic acid sequence of SEQ ID NO:2 encoding a β,β-carotene 15,15'-monooxygenase oxidase of SEQ ID NO:1 and variants and fragments of a nucleic acid molecule encoding a β,β-carotene 15,15'-monooxygenase oxidase.

Wyss et al. (Biochm. J – form PTO-892) teach a nucleic acid molecule that is 100% identical to SEQ ID NO:2. The encoded oxygenase is 100% identical to the oxygenase of SEQ ID NO: 1 (pages 522-525). The nucleic acid sequence of Wyss et al. and the nucleic acid sequence of the instant invention encode the same enzyme.

Wyss et al. also teach fragments, primer/probes and kits comprising said primer/probes (pages 522-523). Wyss et al. teach primers that are 100% identical to the primers of SEQ ID NO:8, 9 and 10 (page 522). Therefore, the nucleic acid sequence of Wyss et al. comprises of SEQ ID NO:2 and fragments of SEQ ID NO:2.

Wyss et al. also teach a method of introducing said nucleic acid sequence into a mammalian cell, a vector comprising said nucleic acid sequence and a host cell transformed with said vector (pages 526).

Therefore, the teachings of Wyss et al. anticipate claims 6-10, 12-15, 19, 24, 26-32 and 34-36.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 19-27 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wyss et al. in view of Santerre et al.

Wyss et al. (Biochem. Biophy. Res. Com.) teach a nucleic acid molecule that is 100% identical to SEQ ID NO:2 of the instant invention, as discussed above.

The difference between the reference of Wyss et al. and the instant invention is that the reference of Wyss et al. does not teach a method of introducing said nucleic acid molecule into a plant host cell, a yeast or fungal host cell, an alga host cell or a human host cell.

In the state of the art, transformation of plant, yeast, fungal, alga or human cells with a nucleic acid molecule encoding a heterologous protein is well known and practiced. Santerre et al. (U.S. Patent No. 4,727,028) teach methods of transforming plant host cells, yeast or fungal host cells, alga host cells or human host cells (Columns 14-15 and 17-33 and claims 1-111).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to introduce the nucleic acid molecule of Wyss

et al. into various host cells as taught by Santerre et al. The motivation of using the method of Santerre et al. is to efficiently produce the recombinant enzyme rather than by standard biochemical purification methods. One of ordinary skill in the art would have had a reasonable expectation of success since expression of heterologous proteins in prokaryotic and eukaryotic host cells are performed routinely in the art.

Claims 6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wyss et al. in view of Takayama et al.

Wyss et al. (Biochem. Biophy. Res. Com.) teach a nucleic acid sequence of SEQ ID NO:2 encoding a protein having the amino acid sequence of SEQ ID NO:1, as discussed above.

The difference between the reference of Wyss et al. and the instant invention is that the reference of Wyss et al. does not teach an antisense of SEQ ID NO:2.

Takayama et al. teach that an antisense RNA can be used to block transcription of a specific gene, thereby inhibiting expression of a functional enzyme (page 155, 1st paragraph). Their use in the art is very well known and established.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to make antisense of the nucleic acid sequence of SEQ ID NO:2. The motivation of making an antisense is to control the expression of the protein encoded by SEQ ID NO:2. One of ordinary skill in the art would have had a reasonable expectation of success since an antisense is used routinely in the art to inhibit transcription.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 6-15, 19-32 and 34-36 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 6-15, 19-32 and 34-36 of copending Application No. 09/504,393. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are drawn to identical nucleic acid sequences encoding the same protein, identical primers/probes, identical kits comprising said primer/probe, identical methods of using said nucleic acid sequence and vectors and host cells comprising said nucleic acid sequence.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yong Pak whose telephone number is 703-308-9363. The examiner can normally be reached on 6:30 A.M. to 5:00 P.M. Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ponnathapu Achutamurthy can be reached on 703-308-3804. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9307 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.

Yong D. Pak
Patent Examiner

September 4, 2003